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**Gravitational wave radiation by LIGO-type detectors and its reciprocity relation with the detector's fundamental quantum limited sensitivity** BELINDA PANG, YIQIU MA, HAIXING MIAO, YANBEI CHEN, Caltech — We relate the radiation of gravitational waves (GW) by a light interferometer with cavity arms (such as LIGO) to its quantum limited sensitivity as a detector of GW's, thereby demonstrating a reciprocity relation between the interferometer's function as a detector and emitter. We derive the pairwise interactions among the cavity optical field, the cavity end mirror, and the gravitational perturbation from the action principle. We quantize these degrees of freedom to calculate the GW's generated by a quantum object. We find that the rate of gravitational wave generation is related to the so-called quantum Cramer Rao bound of the detector, which is a general result from linear measurement theory that gives the fundamental limit to a detector's sensitivity. We show that increasing the maximal sensitivity for the interferometer also increases its GW radiation. This finding may point towards a new paradigm for improving detector sensitivity by maximizing GW radiator.

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